

REMARKS

Summary of the Office Action

In the Office Action, claims 1-9 stand rejected under 35 U.S.C. § 112, 2nd Paragraph.

Claims 1, 3 and 6 stand rejected under 35 U.S.C. § 102 (b), as being unpatentable over U.S. Patent No. 4,419,831 to *Zimmer*.

Claims 1 and 3-9 stand rejected under 35 U.S.C. § 103 (a), as being unpatentable over *Zimmer* in view of EPA 0166002 A1 to *Nakashima*.

Claims 1-3 and 6 stand rejected under 35 U.S.C. § 103 (a), as being unpatentable over *Zimmer* in view of U.S. Patent No. 4,969,108 to *Webb*.

Summary of the Response to the Office Action

Applicant proposes amending claims 1, 4-6, 8 and 9, canceling claim 10, and adding new claims 11-19. Accordingly, claims 1-9 and 11-19 are pending for further consideration.

35 U.S.C. § 112, 2nd Paragraph rejection

Claims 1-9 stands rejected under 35 U.S.C. § 112, 2nd Paragraph.

With regard to the 35 U.S.C. § 112, 2nd Paragraph rejection, the Office Action requires clarification for the terms “step-like” and “generally sharp” in independent claims 1 and 6. Applicant respectfully asserts that as discussed on page 7, lines 3-5 of the specification, and illustrated in Fig. 2, target 4 includes a milled groove designed with two sharp level differences in the form of shoulder parts 7. Based upon this clear disclosure and illustration, these sharp level differences are recited as the “step-like” structural changes in independent claims 1 and 6. In the interest of expediting prosecution of this application, Applicant proposes amending claims 1 and 6 to further recite the “step-like structural changes ... comprising vertical walls or sides,” and to delete the terminology “generally” to further clarify the language of claims 1 and 6.

Accordingly, Applicant respectfully requests withdrawal of the 35 U.S.C. 112, 2nd Paragraph, rejection of claims 1-9.

All Claims are Allowable

In the Office Action, claims 1, 3 and 6 stand rejected under 35 U.S.C. § 102 (b), as being unpatentable over U.S. Patent No. 4,419,831 to *Zimmer*. Claims 1 and 3-9 stand rejected under 35 U.S.C. § 103 (a), as being unpatentable over *Zimmer* in view of EPA 0166002 A1 to *Nakashima*. Claims 1-3 and 6 stand rejected under 35 U.S.C. § 103 (a), as being unpatentable over *Zimmer* in view of U.S. Patent No. 4,969,108 to *Webb*. Applicant traverses these rejections for the following reasons.

With regard to independent claim 1, Applicant respectfully asserts that *Zimmer*, *Nakashima* and *Webb*, viewed either singly or in combination, do not teach or suggest a method for synchronizing a robot including at least, “causing the target to include several distinct detectable changes comprising step-like structural changes, said step-like structural changes being defined by sharp level differences in surfaces of said first robot part and comprising vertical walls or sides, sensing at least two of said distinct detectable changes by the sensor at said respective step-like structural changes, calculating the position of the target by determining a center-point of adjacent step-like structural changes, and introducing the calculated target position into the control system and comparing the target position with a calibration position for the target in the control system,” as recited in independent claim 1, as amended.

Support for these features recited in claim 1 can be found at least on Pages 3-8 of the originally filed specification, and in Figs. 1-4 of the originally filed drawings. Specifically, as shown in Figs. 1 and 2, the present invention provides a method for synchronizing a robot that includes a control system, a first robot part 3 and a second robot part 5 movably attached to first robot part 3. The position of a target 4 arranged on first robot part 3 is determined by the passage of a sensor 6 arranged on second robot part 5. The method includes the step of providing target 4 with a groove (see dependent claim 4) with substantially vertical walls and/or an elevation (see dependent claim 5) with substantially vertical sides, where level differences in respective surfaces of the groove and in respective surfaces of the elevation define distinct detectable structural changes in surfaces of first robot part 3. At least two of the distinct detectable changes are sensed by sensor 6 at the respective structural changes 7, and the position of target 4 is thereby calculated by determining a center-point of adjacent structural changes. This calculated target position is introduced into the control system, and the target position is

compared with a calibration position for the target in the control system to thereby synchronize the robot.

The Office Action maintains that *Zimmer*, *Nakashima* and *Webb* teach or suggest the invention recited in claims 1-9.

Specifically, as discussed in the Amendment filed August 19, 2003, as illustrated in Fig. 1, *Zimmer* discloses a method of positioning two relatively movable parts by using a contact pin 7 to locate the deepest point of notch 2, (Col. 2:52-56). The problems associated with *Zimmer*'s conventional method of synchronizing two relatively movable parts include, for example, damage and wear of the deepest point of notch 2 after successive synchronization attempts (see discussion on page 2, lines 10-13, and page 4, line 25 to page 5 line 8 of specification). This damage results in inaccuracies in synchronization of the movable parts. Additionally, since a point has two flanks, a contact pin such as pin 7 of *Zimmer* is prone to slide down the slanted walls of notch 2. As the target passes back and forth relative to contact pin 7 and pin 7 slides down the walls of notch 2, this sliding also results in inaccuracies due to difficulties associated in following the surface of the point and/or determining the exact location of the point.

In realizing the aforementioned exemplary deficiencies of the invention of *Zimmer*, through extensive research, analysis and experimentation, the Applicant of the invention herein devised the use of a target including "several distinct detectable changes comprising step-like structural changes, said step-like structural changes being defined by sharp level differences in surfaces of said first robot part and comprising vertical walls or sides," as recited in independent claim 1, for synchronizing relatively movable parts in a robot. These structural changes are further used by Applicant for "calculating the position of the target by determining a center-point of adjacent step-like structural changes," as also recited in independent claim 1, as amended. None of the aforementioned features now recited in independent claim 1 are taught or suggested by *Zimmer*. Applicant further asserts that by reading two positions and calculating the center position, the error of measurement is further decreased as compared to the measurement errors associated with the invention of *Zimmer*, (see page 5, line 28 to page 6, line 6 of specification).

With regard to the teachings of *Nakashima*, as illustrated in Fig. 1, *Nakashima* discloses a method of adjusting the origin of various elements of an industrial robot by mechanically aligning corresponding recesses 11a and 12a, for example, by gauges 20 and 21, (page 5, line 21

to page 6, line 9). Applicant respectfully asserts that even though *Nakashima* appears to disclose recesses including vertical walls, *Nakashima* clearly does not recognize the aforementioned exemplary deficiencies of the invention of *Zimmer*. Thus, one of ordinary skill in the art would have no motivation whatsoever to combine the teachings of *Zimmer* and *Nakashima*, and any such combination would clearly be a result of impermissible hindsight reasoning.

With regard to impermissible hindsight reasoning, Applicant respectfully notes that in order to establish a prima facie case of obviousness, three basic criteria must be met, as set forth in M.P.E.P. § 2142.

First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Applicant respectfully asserts that based upon the aforementioned deficiencies cited in the teachings of *Zimmer* and *Nakashima*, these references clearly do not teach or suggest the use of a target including “several distinct detectable changes comprising step-like structural changes, said step-like structural changes being defined by sharp level differences in surfaces of said first robot part and comprising vertical walls or sides,” for synchronizing relatively movable parts in a robot, and the use of these structural changes for “calculating the position of the target by determining a center-point of adjacent step-like structural changes, ” as recited in independent claim 1, as amended.

Second, there must be a reasonable expectation of success. Since none of the cited references recognize the aforementioned drawbacks associated with the synchronization of movable parts in a robot, one of ordinary skill in the art could not reasonably contemplate the invention as recited in independent claim 1, from the teachings of the applied references themselves.

Finally, the prior art reference, and not the Applicant’s disclosure must teach or suggest all the claim limitations. In this regard, as discussed above, it is only through extensive research, analysis and experimentation, by which the Applicant of the invention herein devised the use of a target including “several distinct detectable changes comprising step-like structural changes, said step-like structural changes being defined by sharp level differences in surfaces of said first robot part and comprising vertical walls or sides,” for synchronizing relatively movable parts in a robot, and the use of these structural changes for “calculating the position of the target by

determining a center-point of adjacent step-like structural changes, ” as recited in independent claim 1, as amended. Applicant respectfully asserts that any unfounded combination of the teachings of *Zimmer* and *Nakashima* could only be based on reliance on Applicant’s disclosure, and not the cited references, in concluding that the invention as claimed would be obvious.

With regard to the teachings of *Webb*, as illustrated in Fig. 1 and recognized in the Office Action, *Webb* merely discloses a non-contact optical sensor, but fails to teach or suggest the aforementioned deficiencies in the teachings of *Zimmer* and *Nakashima*.

Accordingly, based upon the aforementioned deficiencies in the teachings of *Zimmer*, *Nakashima* and *Webb*, Applicant respectfully asserts that *Zimmer*, *Nakashima* and *Webb* do not teach or suggest a method for synchronizing a robot including at least, “causing the target to include several distinct detectable changes comprising step-like structural changes, said step-like structural changes being defined by sharp level differences in surfaces of said first robot part and comprising vertical walls or sides, sensing at least two of said distinct detectable changes by the sensor at said respective step-like structural changes, calculating the position of the target by determining a center-point of adjacent step-like structural changes, and introducing the calculated target position into the control system and comparing the target position with a calibration position for the target in the control system,” as recited in independent claim 1, as amended.

As pointed out in MPEP § 2131, “[t]o anticipate a claim, the reference must teach every element of the claim.” “A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Verdegaal Bros. v. Union Oil Co. Of California*, 2 U.S.P.Q.2d 1051, 1053 (Fed. Cir. 1987). Moreover, as pointed out in M.P.E.P. § 2143.03, “[t]o establish prima facie obviousness of a claimed invention, all the claimed limitations must be taught or suggested by the prior art”. *In re Royka*, 409 F.2d 981, 180 USPQ 580 (CCPA 1974). Since these criteria have not been met, Applicant respectfully asserts that the rejection under 35 U.S.C. § 102 (b) should be withdrawn because *Zimmer*, *Nakashima* and *Webb* does not teach or suggest each feature of independent claim 1, as amended.

In view of the above arguments, Applicant respectfully requests the rejection of independent claim 1 under 35 U.S.C. § 102 be withdrawn. Additionally, claims 2-5, which

depend from independent claim 1, are allowable at least because their base claim is allowable, as well as for the additional features recited therein.

Independent claim 6

With regard to independent claim 6, Applicant respectfully asserts that *Zimmer*, *Nakashima* and *Webb*, viewed either singly or in combination, do not teach or suggest a device for synchronizing a robot, including at least, “a target arranged on the first robot part; and a sensor arranged on the second robot part, wherein the target includes several distinct detectable changes comprising step-like structural changes, said step-like structural changes being defined by sharp level differences in surfaces of said first robot part and comprising vertical walls or sides, said sensor sensing at least two of said distinct detectable changes at said respective step-like structural changes to thereby enable the synchronizing of said robot by calculating a position of the target corresponding to a center-point of adjacent step-like structural changes,” as recited in independent claim 6, as amended.

Applicant respectfully asserts that independent claim 6 is allowable for at least the reasons presented above for the allowance of independent claim 1, and the additional features recited therein. In the interest of avoiding redundant arguments, the reasons for the allowance of independent claim 6 are not repeated herein. Additionally, claims 7-9, which depend from independent claim 6, are allowable at least because their base claim is allowable, as well as for the additional features recited therein.

Independent claim 11

With regard to new independent claim 11, Applicant respectfully asserts that *Zimmer*, *Nakashima* and *Webb*, viewed either singly or in combination, do not teach or suggest a method for synchronizing a robot including at least, “causing the target to include at least one of substantially vertical sides and substantially vertical walls, level differences in respective surfaces of said substantially vertical sides or walls defining distinct detectable structural changes in surfaces of said first robot part, sensing at least two of said distinct detectable changes by the sensor at said respective structural changes, calculating the position of the target by determining a center-point of adjacent structural changes, and introducing the calculated target

position into the control system and comparing the target position with a calibration position for the target in the control system,” as recited in independent claim 11.

Applicant respectfully asserts that independent claim 11 is allowable for at least the reasons presented above for the allowance of independent claim 1, and the additional features recited therein. Additionally, claims 12-15, which depend from independent claim 11, are allowable at least because their base claim is allowable, as well as for the additional features recited therein.

Independent claim 16

With regard to new independent claim 16, Applicant respectfully asserts that *Zimmer, Nakashima* and *Webb*, viewed either singly or in combination, do not teach or suggest a device for synchronizing a robot that includes a control system, a first robot part and a second robot part movably attached to the first robot part, the device including, “a target arranged on the first robot part; and a sensor arranged on the second robot part, wherein the target includes at least one of substantially vertical sides and substantially vertical walls, level differences in respective surfaces of said substantially vertical sides or walls defining distinct detectable structural changes in surfaces of said first robot part, said sensor sensing at least two of said distinct detectable changes at said respective structural changes to thereby enable the synchronizing of said robot by calculating a position of the target corresponding to a center-point of adjacent structural changes,” as recited in independent claim 16.

Applicant respectfully asserts that independent claim 16 is allowable for at least the reasons presented above for the allowance of independent claim 1, and the additional features recited therein. Additionally, claims 17-19, which depend from independent claim 16, are allowable at least because their base claim is allowable, as well as for the additional features recited therein.

CONCLUSION

In view of the foregoing, Applicant respectfully requests the entry of this Amendment to place the application in clear condition for allowance or, in the alternative, in better form for appeal. Applicant also requests the Examiner’s reconsideration and reexamination of the

application and the timely allowance of the pending claims. Should the Examiner feel that there are any issues outstanding after consideration of this response, the Examiner is invited to contact Applicant's undersigned representative to expedite prosecution.

If there are any other fees due in connection with the filing of this response, please charge the fees to our Deposit Account No. 04-2223. If a fee is required for an extension of time under 37 C.F.R. § 1.136 not accounted for above, such an extension is requested and the fee should also be charged to our Deposit Account.

Respectfully submitted,

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